40. *Discussion. 92-95 GHz.* The record before us shows that there is considerable interest in using the 92-95 GHz band for unlicensed, Part 15 devices.[123] As previously stated, the FWCC points out that unlicensed devices are ideal for a wide range of applications which require low cost or rapid installation and successfully underlay other applications in the same spectrum.[124] According to NTIA, the NSF has concluded that Part 15 devices restricted to indoor use and no airborne applications would pose no sharing problems for United States radio astronomy facilities under any of the possible 92-95 GHz band plans listed in the *NPRM*.[125] NTIA believes that locating harmful interference into the RAS from unlicensed outdoor devices would be near to impossible since unlicensed users are not registered.[126] We are persuaded that allowing unlicensed devices in this band will spur innovative applications just as in other bands where unlicensed devices are allowed.[127] Accordingly, we will permit Part 15 devices in the 92-95 GHz band for indoor use, but prohibit airborne and spaceborne applications in this band.

41. *71-76 GHz and 81-86 GHz.* Generally, commenters contemplate two-way use of the 71-76 GHz and 81-86 GHz bands, and do not advocate the use of unlicensed devices here.[128] Loea explains that the equipment that has been developed for deployment in the 71-76 GHz and 81-86 GHz bands was not engineered to operate in a Part 15 unlicensed environment.[129] As such, an underlay of unlicensed devices here could detrimentally affect the quality, and thus, buildout of service. In addition, we believe that the 92-95 GHz band will provide adequate spectrum to fill the immediate demand for unlicensed devices in millimeter wave bands.[130] We also believe that the pairable segments in 71-76 GHz and 81-86 GHz bands are more likely to be used for fixed services than the unpaired 92-95 GHz band segments, so the 92-95 GHz band is more conducive to unlicensed use. Accordingly, we will not permit the use of unlicensed devises in the 71-76 GHz and 81-86 GHz bands at this time. We reserve discretion to revisit this decision as the services in these bands mature and new technology is developed regarding sharing.

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[123] FWCC Comments at 7; Wi-Fi Comments at 3; WCAI Comments at 12; Comsearch Reply at 2; NAS Comments at 9 (supports prohibition on airborne and space-borne use of Part 15 devices and sets forth acceptable criteria to reduce the range for harmful interference from a single unit to values acceptable for RAS).

[124] FWCC Comments at 7.

[125] *See* NTIA Reply at 10.

[126] *Id.* at 8-10.

[127] *See* Griff Witte, *Bringing Broadband Over the Mountain*, The Washington Post, Sept. 15, 2003, at E-1 (describes how rural customers who are not served by main stream ISPs have access to broadband via unlicensed spectrum); *see also* Comsearch Reply at 2 (advocating outdoor unlicensed use only if accompanied by a registration/coordination process).

[128] *See, e.g.*, Loea Comments at 16; Terabeam Reply at 4; Cisco Comments at 20-21; Sprint Comments at 6.

[129] Loea Comments at 18. Cisco states that the equipment itself is likely to be different: Unlicensed devices are predominately plug-and-play, consumer-type devices, and licensed devices will require installation and either roof rights or tower leases. Cisco Comments at 21.

[130] *Cf. supra*, ¶ 19 (declining to allocate spectrum for secondary amateur-satellite operations in the 71-76 GHz and 81-86 GHz bands because adequate millimeter wave amateur spectrum is available, and an amateur allocation could complicate coordination).

D. Rules for Licensed Bands

1. Introduction

42. We believe that a flexible licensing approach will allow licensees freedom to determine the services to offer and the technologies to use in providing these services. We also believe that any approach we take must be consistent with our responsibility to promote the provision of communications services to all Americans throughout all parts of the United States and to promote diverse ownership of communications service providers via a variety of platforms. Licensed operations allow the Commission the opportunity to review applicant qualifications and to obtain contact information, should the need arise. We have determined that the following licensing approach allows licensees to make the most efficient use of their assigned spectrum in response to market forces, which will advance the public interest.

2. Operational Rules

a) Non-exclusive Nationwide Licensing

43. *Background.* In the *NPRM*, the Commission sought comment on Loea's proposal to adopt a nationwide licensing scheme with site-by-site coordination.[131] Loea explained that each applicant would file a single application with the Commission for blanket, nationwide authority to provide service in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands. Under Loea's proposal, once the Commission has passed on the applicant's qualifications and granted the license, the licensee would be required to obtain authorization from an independent coordinator in order to construct and operate transmission paths anywhere in the United States.[132] If interference were predicted, the application would be amended at the coordination stage.[133] The Commission also sought comment on whether to adopt a geographic licensing approach and, if so, on what service area definition[134] and coordination process[135] would be appropriate.

44. *Discussion.* Commenters overwhelmingly favor nationwide licensing conditioned upon site (path) specific coordination.[136] They explain that the use of geographic area licensing is not appropriate in these bands, where scope and ubiquity of geographic coverage is not expected to be an important feature of either carrier or private entity operations and where the use of spectrum by one entity in a geographic area very rarely precludes the re-use of that spectrum by another entity due to the highly

[131] *NPRM*, 17 FCC Rcd at 12,206-07 ¶ 65.

[132] Loea Comments at 19.

[133] *NPRM*, 17 FCC Rcd at 12,206-07 ¶ 65.

[134] *Id.* at 12,207 ¶ 66.

[135] *Id.* at 12,207 ¶ 67.

[136] *See, e.g.*, BGI Comments at 1; Boeing Comments at 5-6; Cisco Comments at 18; Comsearch Comments at 3,7; EDS Comment at 1; Endwave Comments at 4-5; FWCC Comments at 10; Harris Comments at 8, 10; KCC Comments at 1; Loea Comments at 16-18, 20; NRAO Comments at 1; National Academies Comments at 8; NTIA Reply at 4-5, 15 (using the terms "band manager" and "coordinator" interchangeably); Sprint Comments at 6; Terabeam Comments at 4, 9-10; WCAI Comments at 15-17.

directional point-to-point "pencil-beam" transmissions.[137] Moreover, some commenters believe that a geographic area licensing approach would force the Commission either to channelize the bands (reducing data capacity),[138] or artificially create spectrum scarcity where none need exist.[139] In addition, Loea avers that the entry costs under a nationwide blanket licensing scheme would be less burdensome than those associated with a geographic area/competitive bidding licensing scheme or the fees that must be paid when separate authorizations are provided on a site-by-site basis.[140] Commenters also suggest that a nationwide blanket licensing scheme would reduce the administrative burdens on the Commission that are associated with traditional site-by-site licensing.[141] On the other hand, Winstar contends that at least fifty percent of the spectrum at issue should be licensed on an exclusive basis, and that at least part of each of the three bands should be auctioned on a geographic basis.[142]

45. We find that the public interest would be served by authorizing the use of these bands through a non-exclusive licensing scheme combined with the site-specific coordination and registration process set out below. We base this conclusion on the unique characteristics of these spectrum bands, the technical characteristics of the technologies proposed for use in these bands, and the need to share these bands with other services including Federal Government systems that are also under development at this time. Systems proposed for these bands concentrate radiated power in a very narrow path and have considerable attenuation at much shorter distances than occurs in the lower microwave bands. In particular, the millimeter wave spectrum is subject to higher free space losses (a 0.65 kilometer path at 92 GHz produces the same loss as a 10 kilometer path at 6 GHz, namely, 128 dB), and the millimeter wave antennas that commenters envision would be used in these bands concentrate energy in a very narrow path (typically 0.4 degrees half power aperture at 92 GHz as opposed to 5.8 degrees at 6 GHz). The record indicates that these systems may be engineered to operate in close proximity to other systems so that many operations can co-exist in the same vicinity without causing interference to one another.[143] In spectrum bands with these characteristics, we believe this approach could be particularly beneficial in less-densely populated rural and suburban areas,[144] where there is an even lower chance of interference. Thus, it is appropriate that we facilitate the sharing of the spectrum among multiple users, which we believe can facilitate the provision of communications services to underserved areas. Moreover, we believe that a non-exclusive licensing approach will allow multiple entities to access the spectrum that has been historically shared with the Federal Government and thereby encourage the provision of new millimeter wave technologies and communications services. Such an approach will allow both non-Federal and Federal Government systems to share these bands while evolving their systems to meet

[137] *See, e.g.*, Comsearch Comments at 3-4; Loea Comments at 22; Terabeam Comments at 8; WCAI Comments at 16.

[138] Cisco Comments at 17.

[139] WCAI Comments at 16.

[140] *See* Loea Comments at 21.

[141] *See, e.g.*, Cisco Comments at 18-21; Loea Comments at 21-22.

[142] Winstar Reply Comments at 3.

[143] *See, e.g.*, Comsearch Comments at 3-4; Loea Comments at 22; Terabeam Comments at 8; WCAI Comments at 16.

[144] For example, Loea states that it has been testing point-to-point technology in the 71-76 GHz and 81-86 GHz bands in Hawaii.

uncertain future needs and requirements. Accordingly, we will implement non-exclusive, nationwide licensing with site-by-site coordination with the Federal Government for the 71-76 GHz, 81-86 GHz and 92-95 GHz bands.[145] For the purposes of non-Federal Government licensee interaction with each other, instead of requiring prior coordination of all prospective links, we will institute the registration mechanism described below, which will provide priority based on date/time of application in any cases in which interference may arise.

46. In this connection, applicant qualification for these non-exclusive nationwide licenses will be assessed in accordance with FCC Form 601 and Commission rules. Those applicants who are approved will each be granted a single, non-exclusive nationwide license.[146] There is no limit to the number of non-exclusive nationwide licenses that may be granted for these bands, and these licenses will serve as a prerequisite for registering individual links. The initial filing date for these licenses will be announced in a future Wireless Telecommunications Bureau (WTB) *public notice*. Operations will be authorized through the registration and coordination process established herein.

47. Each licensee will be able to operate on up to all 12.9 GHz of co-primary spectrum. As noted above, we also are dividing the 71-76 GHz and 81-86 GHz bands into four segments each (eight total), and the portions of the 92-95 GHz band on which non-Federal Government operations are divided into two segments (92-94 GHz and 94.1-95 GHz). The decisions to permit licensees to operate on up to all 12.9 GHz of spectrum and to segment the spectrum are complementary. This spectrum will not be subject to any aggregation limit, so each licensee can use as many segments as it needs. As noted above, however, we do not believe that every licensee will need 12.9 GHz of spectrum. We believe that segmenting the spectrum will provide licensees the flexibility to use as much spectrum as is needed, facilitate coordination and avoid interference.[147]

b) Coordination and Registration

48. *Background.* Because the spectrum at issue is co-allocated on a co-primary basis for both Federal Government and non-Federal Government use, coordination between non-Federal Government (private entities and state and local governments) and Federal Government operations is of critical interest in this proceeding. The classified nature of some Federal Government operations precludes the use of a public database containing both Federal Government and non-Federal Government links, and the existing process requires individual coordination for each link. Thus, another approach is needed.

49. *Discussion.* Commenters generally support the notion of coordination through a third-party entity that would serve as a clearinghouse and repository of site path information and manage the

[145] Because licenses will be non-exclusive, there will be no mutual exclusivity between or among applications. Consequently, our competitive bidding authority is not implicated. *See BBA Report and Order*, 15 FCC Rcd at 22,715 ¶ 14. Given that we are not authorizing licenses via competitive bidding, we have no need to address in this *Report and Order* the various competitive bidding-related issues that were raised in the *NPRM*, which included matters of competitive bidding design, designated entities, bidding credits, application and payment procedures, reporting requirements, collusion issues, and unjust enrichment. *See NPRM*, 17 FCC Rcd 12,223-28 ¶¶ 104-116.

[146] 47 C.F.R. §§ 1.913-1.917. FCC Form 601 - *Application for Authorization in the Wireless Radio Service.*

[147] This is similar to the approach we took in the 4.9 GHz proceeding, where licensees are authorized to operate on any spectrum within the fifty megahertz band, but must follow a spectrum utilization plan. *See 4.9 GHz Third R&O*, 18 FCC Rcd at 9167-69 ¶¶ 37-40.

coordination of Federal Government and non-Federal Government links.[148] We agree that we should adopt a streamlined process, particularly in light of the potential for thousands of coordinated paths in these bands. We thus adopt a process under which coordination with Federal Government links will occur via an automated mechanism administered by the NTIA and under which interference protection among non-Federal Government links will be determined by the date/time of individual link registration in a database of such links. In order to minimize the administrative burden of coordination on Commission resources, we reserve the discretion to designate one or more third-party database managers to maintain a repository for the non-Federal Government links, and understand that the NTIA intends to maintain the repository for Federal Government links. Accordingly, we adopt the following coordination procedures.

50. *Database managers of non-Federal Government links.* Non-Federal Government links are to be registered in a third-party (*i.e.*, non-FCC) database, which will be open to all interested parties for review.[149] We define the rights and responsibilities of a database manager as follows. A database manager will have access to its own database as well as NTIA's planned automated coordination mechanism (as discussed below), and must make its services available to all parties on a first-come, first-served, non-discriminatory basis.[150] If more than one database manager is selected, they will use a single, shared database.[151] A database manager will provide for the registration of requested links but is not required to decide which frequency should be used. Although a database manager is not required to determine whether a proffered link creates a frequency conflict in the context of its database,[152] once notified of an interference complaint, it is required to notify the relevant licensee(s), as set forth below.[153] A database manager is also permitted to offer optional services to licensees, such as coordination analysis of proposed links with prior-registered links. In addition, the database manager must provide access to the database to NTIA and the Commission.

51. One or more database managers will be selected. We note that in the past the Commission has tried, where appropriate, to introduce market forces into the frequency coordination process, because competition among coordinators promotes cost-based pricing and provides incentives for enhancing customer service,[154] and we expect the benefits of competition to be considered during the selection process. We anticipate written agreements between the Commission and these database managers, as has been done in other contexts.[155] We have not found it necessary to set limits on the fees charged by

[148] *See, e.g.,* Cisco Comments at 18-19; Comsearch Comments at 5; FWCC Comments at 11; Loea Comments at 19-20; NTIA Reply at 15; WCAI Comments at 19.

[149] Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, *Report and Order*, ET Docket No. 99-255, 15 FCC Rcd at 11,220 ¶ 42 (2000) (*WMTS R&O*).

[150] *See, e.g., id.* at 11,218 ¶ 33.

[151] *See* Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, *Second Report and Order*, PR Docket No. 92-235, FCC Rcd at 14,332-333 ¶¶ 45-47 (*Refarming 2nd R&O*).

[152] *WMTS R&O*, 15 FCC Rcd at 11,218 ¶ 33.

[153] See *infra* para. 58.

[154] *See Refarming R&O,* 14 FCC Rcd at 14,328 ¶ 40.

[155] A Memorandum of Understanding (MOU) will be effective upon execution. *See, e.g.*, Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, *Order,* ET Docket 99-255, 16 FCC (continued....)

coordinators in other services,[156] and we have no reason to believe that fee limits will be necessary here. Accordingly, we will allow the designated database manager to set the fee structure as necessary to recoup costs. Proposals will be solicited from interested parties in a future *public notice* by Commission staff. After the selection process is complete, another *public notice* will be released announcing how licensees may register their links.

52. *Permanent registration.* On a going-forward basis, we are working cooperatively with NTIA to facilitate an innovative, streamlined process that will enable licensees to expedite service to the public.[157] The plan for the non-Federal Government links is comprised of two components: (a) Non-Federal Government link coordination with the Federal Government, and (b) registration of non-Federal Government links in a database. In addition, there is a separate coordination process that commences when the Federal Government seeks to coordinate its links with non-Federal Government links. The new procedures we are adopting are as follows:

53. *Supporting data.* A licensee must generally supply the following data for each requested site: call sign, site coordinates, site elevation, antenna centerlines, azimuth and elevation angle (receive and transmit), antenna types (receive and transmit), emission type, EIRP, equipment manufacturer and model, transmit and receive frequencies.[158] This information is set forth with more specificity in Appendix C.

54. Part A: Coordination of Non-Federal Government with Federal Government links. As a result of ongoing discussions with the NTIA, we understand that NTIA will be developing an automated mechanism that will determine whether proposed non-Federal Government operations may interfere with Federal Government operations.[159] It is anticipated that this automated mechanism will help to ensure that non-Federal Government licensees protect prior-registered Federal Government operations, radio astronomy sites, and satellite earth station sites listed in footnote US389. We understand that information regarding a proposed non-Federal Government link will be entered into the NTIA automated mechanism by either the database manager or an FCC licensee in these bands. The automated mechanism will then transmit either a "green light" or a "yellow light," *i.e.*, it will indicate whether the proposed link poses any potential harmful interference to Federal Government (or non-Federal Government RAS) users. Upon receipt of a green light, the link will be deemed to have been coordinated with the Federal Government. It is anticipated that a green light will trigger almost-instantaneous registration. This coordination process is thus analogous to the registration of a personalized license plate in Virginia, where a vehicle owner can enter a proposed personalized license plate into the website

(Continued from previous page)
Rcd 4543, 4551 ¶ 48 (WTB PSPWD 2001).

[156] Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, *Report and Order*, ET Docket No. 99-255, 15 FCC Rcd 11,206, 11,218-19 ¶ 36 (2000) (*WMTS R&O*).

[157] The anticipated NTIA web-site differs from the third-party database in that the NTIA web-site will contain Federal Government links, which will not be directly accessible to non-Federal Government entities (such as third-party database managers and licensees), and the third-party database will contain non-Federal Government links as well as the result of the coordination process (registration, as well as date of attempted registration pending the outcome of IRAC coordination).

[158] In addition, for some proposed links, the licensee will have to submit documentation that an individual application has been filed with the Commission. *See infra* ¶ 62.

[159] We understand that the entity entering the proposed path data into the NTIA website will not have direct access to the underlying information regarding specific Federal Government sites.

of the Department of Motor Vehicles, and receive immediate feedback concerning whether the requested tag is available.[160] If a yellow light is received, the licensee must file an application for the requested link with the Commission, which in turn will submit the application to the Interdepartment Radio Advisory Committee (IRAC)[161] for individual coordination as under current procedures.[162] A third-party database manager will record the date/time and coordinates of the requested link and flag it as requiring IRAC coordination, in order to protect the licensee's interference rights as against other non-Federal Government licensees (discussed *infra*). Thus, protection rights for a link that requires IRAC coordination is triggered on the initial date that the link is submitted to NTIA.

55. Part B: Registration of Non-Federal Government links. A non-Federal Government licensee must receive a green light from the NTIA coordination website or IRAC approval before a link registration can take effect for interference protection purposes. Upon receipt of NTIA approval, a third-party database manager will ensure that the link registration will take effect in the third-party database. No further action is needed, unless a database manager is notified of an interference complaint. Such notification triggers formal interference protection procedures (discussed *infra*).

56. In addition, the following types of non-Federal Government links require the filing of an FCC Form 601 for each link for the purpose of registration and coordination, in addition to being registered in the third-party database: (1) facilities requiring the submission of an Environmental Assessment,[163] (2) facilities requiring international coordination,[164] and (3) operation in quiet zones.[165] The Commission believes the licensee is in the best position to determine the nature of its operations and whether those operations impact these settings. Consequently, the licensee will be required to submit to a database manager, as part of the registration package, documentation that an FCC Form 601 has been filed.

57. Federal Government with Non-Federal Government. The NTIA will be able to check a proposed Federal Government link against the third-party database. Federal Government users must protect prior-registered non-Federal Government links.[166] We note that airborne radio location systems are understood to be compatible with all applications in the 92-95 GHz band. Thus, these systems will not be part of the coordination or interference protection procedures.

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[160] *See* www.dmv.state.va.us/dmvnet/plate_purchase/select_plate.

[161] The IRAC consists of a representative appointed by each of approximately twenty member Federal departments and agencies together with such other departments and agencies as NTIA might designate. The IRAC's substructure consists of the Frequency Assignment Subcommittee (FAS), the Spectrum Planning Subcommittee (SPS), the Technical Subcommittee, the Radio Conference Subcommittee, Emergency Planning Subcommittee, the International Notification Group, and a number of ad hoc working groups. Liaison between the IRAC and the FCC is effected by a representative appointed by the FCC to serve in that capacity.

[162] Under a yellow light scenario, a licensee may be required to submit additional information, such as the antenna pattern. Given the "pencil-beam" character of millimeter waves, we do not expect yellow lights to be common.

[163] *See* 47 C.F.R. § 1.1307.

[164] *See, e.g.* 47 C.F.R. § 1.928 (regarding frequency coordination arrangements between the United States and Canada).

[165] 47 C.F.R. § 1.924.

[166] *See* ¶ 25, *supra*.

58. *Formal Interference Protection Procedures.* Formal interference protection procedures are initiated when a third-party database manager is notified of harmful interference. Interference protection rights are date-sensitive and are based either on the date NTIA coordination is triggered (in the case of a yellow light), or on the date that the link is first registered (in the case of a green light). In the event of harmful interference,[167] the first-in-time registered link is entitled to protection, and the later-in-time registered link must be discontinued or modified to resolve the problem. Thus, a licensee who experiences harmful interference should report this to the database manager, who identifies the problem link. If the complaining licensee's link is not first-in-time, the third-party database manager will explain that the licensee can either accept the interference or move the link. If the complaining licensee's link is first-in-time, the database manager will inform the later-registered overlapping operator, who must resolve any identified interference immediately. We anticipate that licensees will resolve any identified complaints among themselves. However, if the complaining licensee is not satisfied that any interference has been resolved, then after thirty days, a complaint may be filed with the Commission. The Commission will resolve unsolved disputes on a case-by-case basis and may instruct the database manager to remove the offending link from the registry. Where it appears that Federal Government operations are a source of interference to non-Federal Government licensees, the Commission will work with NTIA to resolve the issue. Similarly, where it appears that non-Federal Government licensees are a source of interference to Federal Government operations, the Commission will work with NTIA to resolve the issue.

59. *Implementation.* NTIA has indicated that it believes it can make the initial version of the automated mechanism available within four months of an agreement on the framework of the coordination procedure. Thus, within four months of the publication of this *Report and Order* in the *Federal Register*, Commission staff, in conjunction with the NTIA, will release a *public notice* specifically explaining how the coordination of non-Federal Government links with Federal Government users will work, the information that users will enter into the system, what these users will receive in response to the data entered, who will maintain the system and when the system will commence operations. In addition, at that time, Commission staff will announce via *public notice* the start-date for the new procedure that we adopt herein for mitigating interference among non-Federal Government links.

60. *Interim process.* Between the time that WTB begins accepting applications for non-exclusive licenses and the implementation of the new procedures adopted herein, coordination of non-Federal Government links with Federal Government operations will be accomplished under the existing coordination process. Each link must be registered in the Commission's Universal Licensing System (ULS) and also requires coordination with NTIA through IRAC. While this interim process remains in effect, NTIA has informed us, it will, through the IRAC's Frequency Assignment Subcommittee, coordinate private sector requests within fourteen working days of receipt.[168] We do not believe that the IRAC coordination process will be burdensome on the Commission or NTIA resources on a temporary basis because we do not anticipate that many licensees will seek to register links until the necessary mechanisms are in place, and until approved equipment becomes commercially available.

[167] We consider harmful interference to exist when a threshold-to-interference ratio (T/I) is determined to cause 1.0 dB of degradation to the static threshold of the protected receiver.

[168] NTIA has further indicated that it will provide a website indicating the applications that it has received from the Commission, the date received, the date action is complete, and the status. NTIA will provide the location of that site via a public notice.

c) Satellite Earth Stations

61. FSS, MSS, and Broadcast Satellite Service (BSS) have co-primary allocations in various portions of these bands. In addition, the possibility exists that both geostationary satellite orbit (GSO) and non-geostationary satellite orbit (NGSO) satellites will be transmitting in portions of the 71-76 GHz FSS, MSS, and BSS downlink bands. This section addresses satellite and terrestrial entities that eventually seek to obtain licenses in these bands and potential coordination between these operations. The Commission's Rules relating to satellite operations are contained in Part 25.[169] In this regard, we note that we must take further action under Part 25 of our Rules for earth stations to operate in the 71-76 GHz (downlink) and 81-86 GHz (uplink) bands.

62. Although satellite operations are allocated for portions of the 71-76 GHz and 81-86 GHz bands, the Commission has not yet permitted such use. Until a future proceeding is completed, entities seeking to provide satellite operations under a separate Part 25 license need to have some assurance that the terrestrial licensees will coordinate or otherwise accommodate the satellite operations. However, because the satellite industry has not developed technical parameters for operations in the 71-76 GHz and 81-86 GHz bands, we cannot derive precise methods upon which to coordinate or allow the use of the various stations that may operate in these bands. Therefore, we will maintain multiple services in the allocation table and address possible sharing criteria in the future.

63. Therefore, all terrestrial 71-76 GHz and 81-86 GHz band entities are hereby made aware that future operations of satellite and satellite earth stations could be permitted in the 71-76 GHz and 81-86 GHz bands. Once the Commission considers and adopts technical standards for terrestrial and satellite operations to share this spectrum, all licensees will be expected to satisfy these and any other Part 101 requirements.

d) Eligibility

(1) Foreign Ownership

64. *Background.* As noted in the *NPRM*, licensees in the 71-76 GHz, 81-86 GHz and 92-95 GHz will be subject to section 310(a), which prohibits the granting of any license to be held by a foreign government or its representative, and may be subject to Section 310(b), which prohibits the grant of a common carrier license to an applicant who fails any of the four citizenship requirements listed therein. Thus, Section 101.7 of the Commission Rules, which implements Section 310 of the Act, as amended, will be applied to the subject bands.

65. Further, the Commission noted[170] that in response to its commitments under the World Trade Organization (WTO) Basic Telecommunications Agreement, the Commission liberalized its policy for applying its discretion with respect to foreign ownership of common carrier radio licensees under Section 310(b)(4).[171] Under its new policy, the Commission now presumes that ownership by entities from

[169] 47 C.F.R. Part 25.

[170] *NPRM*, 17 FCC Rcd at 12,210 ¶ 75.

[171] The commitments are incorporated into the General Agreement of Trade in Services (GATS) by the Fourth Protocol to the GATS. *See* Fourth Protocol to the General Agreement on Trade in Services (WTO 1997), 36 I.L.M. 366 (1997).

countries that are WTO members serves the public interest.[172] Ownership by entities from countries that are not WTO members continues to be subject to the "effective competitive opportunities" potential established earlier by the Commission.[173]

66. *Discussion.* Based on the reasons stated in the *NPRM*, we will apply Section 101.7 of the Commissions Rules without modification to the subject bands. As the Commission has done in the case of the Multipoint Distribution Service (MDS), satellite service, and the Local Multipoint Distribution Service (LMDS), we will require an applicant electing non-common carrier status to also submit the same information that common carriers applicants must submit in order to address the alien ownership restrictions under Section 310(b) of the Act.[174] Because the subject licensees are permitted to offer both common and non-common carrier services, we believe that this requirement is necessary in order to enable us to ascertain compliance of all licensees with the alien ownership restrictions set forth in Section 101.7 of the Commission's Rules. This information can be used whenever the licensee changes to common carrier status without imposing an additional filing requirement when the licensee makes the change.[175] We note, moreover, that we would not disqualify an applicant requesting authorization exclusively to provide non-common carrier service from obtaining a license solely on the basis that its citizenship information would disqualify it from receiving a common carrier license.

67. Accordingly, common carrier and non-common carrier licensees will be required to provide the alien ownership information requested by FCC Form 601. Moreover, both common carriers and non-common carriers must amend their FCC Form 602 to reflect any changes in foreign ownership information.

(2) Eligibility Restrictions

68. *Background.* In the *NPRM,* the Commission sought comment on whether any eligibility restrictions are appropriate for the 71-76 GHz, 81-86 GHz and 92-95 GHz bands.[176] Loea and others support the Commissions decision not to impose any eligibility restrictions.[177]

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[172] *See* Rules and Policies on Foreign Participation in the U.S. Telecommunications Market and Market Entry and Regulation of Foreign-Affiliated Entities, *Report and Order and Order on Reconsideration,* IB Docket No. 95-22, 12 FCC Rcd 23891, 23935-47, ¶¶ 97-132 (1997) (*Foreign-Affiliated Entities Report and Order on Reconsideration*).

[173] *Id.*

[174] *See* Revisions to Part 21 of the Commission's Rules regarding the Multipoint Distribution Service, *Report and Order*, CC Docket No. 86-179, 2 FCC Rcd 4251, 4253 ¶ 16 (1987); Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures, *Report and Order*, IB Docket No. 95-117, 11 FCC Rcd 21581, 21599 ¶ 43 (1996); Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules for Local Multipoint Distribution Service and for Fixed Satellite Services, *Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rule Making,* CC Docket No. 92-297, 12 FCC Rcd 12,545, 12,651 ¶ 243 (1997).

[175] We note, however, that to the extent that a licensee's decision to change its regulatory status raises issues with respect to that licensee exceeding the benchmark contained in Section 310(b)(4), the rules require the Commission's prior approval before the licensee can make this change. *Foreign-Affiliated Entities Report and Order on Reconsideration*, 12 FCC Rcd at 23,891, 23,940-41 ¶¶ 111-118.

[176] *NPRM,* 17 FCC Rcd 12,211-12 ¶¶ 77-78.

69. In Section 257 of the Act, Congress articulated a "national policy" in favor of "vigorous economic competition" and the elimination of barriers to market entry by a new generation of telecommunications providers.[178] Toward that end, the Commission has created a standard for determining whether an eligibility restriction is warranted for certain services.[179] Specifically, this standard demands that an eligibility restriction be imposed only when there is significant likelihood of substantial harm to competition in specific markets and when the restriction will be effective in eliminating that harm.[180] This standard involves examining a number of market facts and circumstances, including economic incentives, barriers to entry, and potential competition.[181] In addressing the issue of eligibility restrictions in the *NPRM*, the Commission sought to determine whether open eligibility imposes a significant likelihood of substantial competitive harm in specific markets, and, if so, whether eligibility restrictions are an effective way to address that harm.[182]

70. *Discussion*. As the development of the "substantial competitive harm" standard suggests, the Commission has in recent years sought to promote open competition and has favored reliance on market forces to guide license assignment absent a compelling showing that regulatory intervention to exclude potential participants is necessary.[183] In this proceeding, we have adopted a licensing approach that is a hybrid that combines the "exclusive use"[184] and the "commons"[185] models, which rely primarily on technical rules to protect spectrum users against interference. We find that under this approach there is no significant likelihood of competitive harm in any markets and therefore no compelling reason to impose eligibility restrictions. We believe that opening the 71-76 GHz, 81-86 GHz and 92-95 GHz bands

(Continued from previous page)

[177] Cisco Comments at 22; Loea Reply at 17.

[178] *See* 47 U.S.C. § 257.

[179] *See, e.g., 39 GHz R&O*, 12 FCC Rcd at 18,617-19 ¶¶ 30-33.

[180] *Id.* at 18,619 ¶ 32.

[181] Rule Making to Amend Parts 1, 2, 21,and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Services and for Fixed Satellite Services, *Third Order on Reconsideration*, CC Docket No. 92-297, 13 FCC Rcd 4856, 4861 ¶ 7, 4863 ¶ 12 (1998).

[182] *NPRM,* 17 FCC Rcd at 12,212 ¶ 78.

[183] *See, e.g.,* Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, *Notice of Proposed Rule Making and Memorandum Opinion and Order,* WT Docket No. 03-66, 18 FCC Rcd 6722, 6773 ¶ 121 (2003). *See also* Spectrum Policy Task Force Report, ET Docket No. 02-135, at 5 (Nov. 2002) ("it is important that the Commission continue to optimize and facilitate access to and use of the radio spectrum").

[184] "Exclusive use" is a licensing model in which a licensee has exclusive and transferable rights to the use of specified spectrum within a defined geographic area, with flexible use rights that are governed primarily by technical rules to protect spectrum users against interference. Under this model, exclusive rights resemble property rights in spectrum, but this model does not imply or require creation of "full" private property rights in spectrum.

[185] The "commons" model allows unlimited numbers of unlicensed users to share frequencies, with usage rights that are governed by technical standards or etiquettes but with no right to protection from interference. Spectrum is available to all users that comply with established technical "etiquettes" or standards that set power limits and other criteria for operation of unlicensed devices to mitigate potential interference.

to as wide a range of applicants as possible will encourage new entry and investment as well as entrepreneurial efforts to develop new technologies and services, while helping to ensure efficient spectrum use. We further believe that this approach will promote economic opportunity and competition in the subject bands.

(3) Spectrum Leasing

71. *Background*. In the *BBA Report and Order*, the Commission recognized the use of band managers as a future option for spectrum licensing.[186] Band managers are a class of licensees that lease their spectrum to other entities through private, written agreements. In the *NPRM*, the Commission requested comment on whether band managers would be appropriate in a geographic area licensing context.[187] More recently, we adopted the *Secondary Markets Report and Order*, in which we facilitate and streamline the ability of spectrum users to gain access to licensed spectrum by entering into spectrum leasing arrangements with licensees in our Wireless Radio Services that hold exclusive rights to the spectrum.[188]

72. *Discussion*. Comsearch believes that if the Commission selects a geographic area licensing scheme, then band managers must be included among the eligible licensees in order to ensure the availability of spectrum to multiple users.[189] However, many commenters do not favor the use of band manager licensing here, because the low risk of interference precludes mutual exclusivity and enables the Commission to award licenses through a low-cost, streamlined process.[190] Thus, commenters aver that band managers would impose unnecessary costs on spectrum users.[191] Moreover, Loea explains that the existing band manager construct grants title to the license to the band manager, and not the service provider, thus rendering end user service vulnerable to the financial position of the manager.[192] In the context of the 71 and 81 GHz spectrum, Loea believes that band managers would impede the development of services because few would be willing to invest in networks if their use is based on a revocable license held by a third-party over which they have no control.[193]

73. Under the nationwide, non-exclusive licensing approach we adopt in this *Report and Order* today, we believe that licensees will be given optimal flexibility when developing and deploying these

[186] *BBA Report and Order*, 15 FCC Rcd at 22727-35 ¶¶ 35-50.

[187] *NPRM*, 17 FCC Rcd at 12,212 ¶ 79.

[188] *See generally* Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report and Order and Further Notice of Proposed Rule Making*, WT Docket No. 00-230, FCC 03-113 (rel. Oct. 6, 2003) (*Secondary Markets Report and Order*). Here, "spectrum lessees" refer to those entities that lease spectrum usage rights licensed by the Commission to other entities.

[189] Comsearch Comments at 9. Comsearch does not address any specific issues concerning such implementation.

[190] BGI Comments at 1; Cisco Comments at 17; Comsearch Comments at 9; EDS Comment at 1; Harris Comments at 9; KCC Comments at 1; Loea Comments at 26-27; Loea Reply at 16; Sprint Comments at 7; Terabeam Comments at 14; WCAI Comments at 17-20.

[191] Loea Reply at 16; WCAI Comments at 17.

[192] Loea Reply at 16.

[193] *Id.* at 16-17.

spectrum bands. The licensing scheme we employ here will permit an almost unlimited amount of access. In addition, there will be a high degree of spectrum re-use in these bands, combined with the unlikelihood of harmful interference. Accordingly, the traditional licensing and spectrum leasing arrangements as described in the *Secondary Markets Report and Order* are not applicable,[194] and we do not see a need to apply those spectrum leasing rules and policies to the millimeter wave spectrum at this time.

e) Canadian and Mexican Coordination

74. *Background.* As noted in the *NPRM*, there are no current international agreements between and among the United States, Mexico and Canada with regard to the subject 71-76 GHz, 81-86 GHz and 92-95 GHz bands.[195] However, as a general rule, wireless operations must not cause harmful interference across the Canadian and Mexican borders.

75. *Discussion.* In order to ensure that 71-76 GHz, 81-86 GHz and 92-95 GHz band operations do not cause harmful interference across our Canadian and Mexican borders, we will apply the restrictions at the border that are found in 1.928(f)[196] of our rules for both Mexico and Canada. If, in the future, coordination agreements between and among the United States, Mexico and Canada should arise, we will require that licensees comply with the provisions contained in those agreements.

f) License Term

76. *Background.* In the *NPRM*, the Commission sought comment on the appropriate license term for licensees in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands.[197] It also noted that licenses authorized under Part 101 of our Rules are licensed for a period of ten years.[198]

77. *Discussion.* Commenters generally support the Commission's proposal to adopt a ten-year license term for each license in the subject bands. We conclude that it is in the public interest to adopt such a ten-year license term. We believe that this approach will provide a stable regulatory environment that will be attractive to investors and, thereby, encourage development of these frequency bands. It will also provide licensees with ample time to develop these spectrum bands as the market demands and to employ innovative technologies that may not be available immediately upon licensing.

g) Other Licensee Obligations

78. *Background.* In the *NPRM*, the Commission sought comment on whether to apply the construction requirements set forth in Section 101.63 of our Rules.[199] Section 101.63 provides, *inter alia*, that licensees authorized under Part 101 of our Rules must be in operation within 18 months from the

[194] *See Secondary Markets Report and Order* at ¶ 84 (spectrum leasing policies apply to services in which licensees hold exclusive use rights with respect to the spectrum).

[195] *NPRM*, 17 FCC Rcd at 12,214 ¶ 82.

[196] 47 C.F.R. § 1.928(f).

[197] *NPRM*, 17 FCC Rcd at 12,214 ¶ 83.

[198] *See* 47 C.F.R. § 101.67.

[199] *NPRM*, 17 FCC Rcd at 12,216 ¶¶ 86-87.

initial date of grant.[200] Section 101.63 further provides that failure to timely begin operation of the station will result in the automatic cancellation of that authorization.[201] The Commission sought comment on this construction requirement, as well as alternative construction requirements, for site-based licenses in these bands.

79. *Discussion.* Loea, WCAI and others believe that each site-based license should include a condition providing that once a licensee obtains approval for any individual path, it must complete construction of that path within six months, a shorter period than other Part 101 site-based licenses. These parties believe that this shorter construction period will keep licensees from arbitraging high-value paths.[202] Cisco seeks to further compress the construction requirement, giving each licensee up to 120 days to complete construction and bring any given link into regular use, commencing upon FCC licensing of the path in question in the case of the initial link. In the case of subsequent links, Cisco believes that the construction requirement should commence upon notification by the band manager that the path in question has been successfully coordinated and notified to the Commission.[203]

80. The overarching purpose of our requirements in this setting, concerning link construction, modification, and discontinuance, is to ensure that spectrum is put to use and to maintain the integrity of the information in the relevant databases by correctly reflecting the actual record concerning these issues.[204] We applaud the aggressive construction requirements set forth in the record, and are persuaded to shorten the traditional 18-month construction requirement to 12 months. Therefore, we will adopt the 12-month construction requirement and revise Section 101.63 of our Rules accordingly for this service. In addition, we clarify that in this setting, each construction period will commence on the date that the third-party database manager registers each link.[205] Moreover, at this time, we will not require users to file a notification requirement as mandated by Section 1.946(d) of the Commission's Rules, but will rely on licensees to notify a database manager to withdraw unconstructed links from the database. If a database manager or other user (whether a Federal Government operation or non-Federal Government licensee) finds that a link is unconstructed after the required timeframe, the database manager is instructed to remove it from the registry. In addition, forfeiture and termination of a link will be handled in accordance with Section 101.65 of our rules.[206] We reserve the discretion to revisit this issue if our experience indicates that additional measures are necessary.

81. We note that each non-Federal Government link will be permitted to use as many of the 1.25 GHz segments in the 71-76 GHz and 81-86 GHz bands, and as much of the two segments (92-94 GHz and 94.1 to 95 GHz) in the 92-95 GHz band as needed. An entity may request any portion of this

[200] *See* 47 C.F.R. § 101.63(a).

[201] *See* 47 C.F.R. § 101.63(b).

[202] Harris Comments at 11-12; Loea Reply at 11, 17; Terabeam Comments at 15; WCAI Comments at 22. One example of a high-value path is the Empire State Building to the Chrysler Building.

[203] Cisco Comments at 22.

[204] In this setting, if the construction requirement is not met, although the licensee will not be barred from constructing later, it will loose the original registration date for the purpose of interference protection procedures.

[205] *See* 47 C.F.R. § 101.63.

[206] 47 C.F.R. § 101.65.

spectrum, up to 12.9 GHz, as the licensee wishes. However, commercial licensees will have to meet the loading requirements of Section 101.141 of the Rules which is a minimum of one bit per Hertz. If it is determined that a licensee has not met the loading requirements, then the database will be modified to limit coordination rights to the spectrum that is loaded and the licensee will lose protection rights on spectrum that has not been loaded.[207]

b) Application of Title II Requirements to Common Carriers

82. *Background.* In the *NPRM*,[208] the Commission sought comment on whether it should forbear from applying certain obligations on common carrier licensees in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands pursuant to Section 10 of the Act.[209] In the case of CMRS providers, the Commission concluded that it was appropriate to forbear from Sections 203, 204, 205, 211, 212, and most applications of Section 214.[210] The Commission, however, declined to forbear from enforcing other provisions, including Sections 201 and 202.[211] The Commission also has exercised its forbearance authority in permitting competitive access providers and competitive local exchange carriers to file permissive tariffs.[212]

83. *Discussion.* WCAI and others urge the Commission to forbear from applying Title II requirements in these bands, in an era of flexible use where CMRS carriers are permitted to provide fixed wireless service and vice-versa,[213] and where there is no reason for the Commission to retain an archaic distinction between the two where regulatory forbearance is concerned, particularly given the size of wireless broadband's market share relative to that of cable modem and DSL services.[214] Cisco avers that

[207] If it is determined that a licensee has not met the loading requirement, then the database will be modified to limit coordination rights to the spectrum that is loaded. The licensee will lose protection rights on spectrum that has not been loaded.

[208] *NPRM*, 17 FCC Rcd at 12,217 ¶ 89.

[209] *See* 47 U.S.C. § 160(a)(1)-(3). This section provides the Commission with authority to forbear from application of virtually any regulation or any provision of the Act to a telecommunications carrier or telecommunications service, or a class of carriers or services. However, the Commission may not forbear from applying the requirements of 47 U.S.C. §§ 251(c) and 271 until it determines that those requirements have been fully implemented. *See* 47 U.S.C. § 160(d).

[210] *See* Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, *Second Report and Order*, GN Docket No. 93-252, 9 FCC Rcd 1411, 1478-81 ¶¶ 175-182 (1994).

[211] *See id.*; Personal Communications Industry Association's Broadband Personal Communications Services Alliance's Petition for Forbearance for Broadband Personal Communications Services, Forbearance from Applying Provisions of the Communications Act to Wireless Telecommunications Carriers, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, WT Docket No. 98-100, 13 FCC Rcd 16857, 16914 (1998) (declining to forbear from applying Section 20.12(b) of the Commission's Rules (resale rule) and Sections 201 and 202 of the Communications Act). *See also* RegioNet Wireless License, LLC, *Order*, 15 FCC Rcd 16,119 (2000).

[212] *See* Hyperion Telecommunications, Inc. Petition Requesting Forbearance, Time Warner Communications Petition for Forbearance, Complete Detariffing for Competitive Access Providers and Competitive Exchange Carriers, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, CC Docket No. 97-146, 12 FCC Rcd 8596, 8608-10 ¶¶ 24-27 (1997).

[213] Cisco Comments at 22; Terabeam Comments at 15; WCAI Comments at 22.

[214] Terabeam Comments at 15; WCAI Comments at 22.

Title II regulation is unnecessary because (a) the market is fully competitive, with no incumbents and no barriers to simultaneous entry by any number of independent licensees; (b) the technology is by nature "anti-bottleneck" making it difficult for any carrier to maintain unjust, unreasonable, or discriminatory charges, practices, classifications, or regulations; and (c) enforcement is not necessary for consumer protection because upon dissatisfaction, a customer can operate its own path.[215]

84. While we seek to provide flexible, streamlined service in these bands, we wish to protect common carrier customers from being adversely affected by discontinued, reduced or impaired service.[216] Therefore, those who seek forbearance from any section of Title II must meet the requirements of Title I, Section 10(a) as follows:

- Enforcement of such regulation or provision is not necessary to ensure that the charges, practices, classifications, or regulations by, for, or in connection with that telecommunications carrier or telecommunications service are just and reasonable and are not unjustly or unreasonably discriminatory;[217]
- Enforcement of such regulation or provision is not necessary for the protection of consumers;[218] and
- Forbearance from applying such provision or regulation is consistent with the public interest.[219]

85. The commenters have not addressed this issue with sufficient specificity to allow us to conclude that these criteria have been met. Accordingly, we will not forebear from any section of Title II at this time. However, as service in these bands develops, we will consider specific, supported requests for forbearance.

i) Partitioning and Disaggregation

86. *Background.* In the *NPRM,* the Commission proposed to allow licensees to partition their own service areas and to disaggregate their respective spectrum.[220] We allow partitioning and disaggregation in other microwave services, such as the 39 GHz Service[221] and LMDS.[222] In a number of recent proceedings, we have adopted a flexible approach for partitioning and disaggregation.[223] This approach

[215] Cisco Comments at 23.

[216] 47 U.S.C. § 214(a).

[217] *See* 47 U.S.C. § 160(a)(1).

[218] *See* 47 U.S.C. § 160(a)(2).

[219] *See* 47 U.S.C. § 160(a)(3).

[220] *NPRM,* 17 FCC Rcd at 12,218 ¶ 91.

[221] See 47 C.F.R. § 101.56.

[222] See 47 C.F.R. § 101.1111.

[223] See, e.g., MAS Report and Order, FCC No. 99-415 at ¶¶ 78-88; 39 GHz MO&O, 14 FCC Rcd 12428; Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, PR Docket (continued....)

is intended to encourage spectrum efficiency and afford all parties an opportunity to respond to market demands for services and/or spectrum in unserved and underserved areas.[224]

87. *Discussion.* The use of partitioning and disaggregation is pertinent in geographic licensing settings where the licensee has exclusive use of a particular area. That is not the case here. Thus, we determine that our decision to authorize these bands on the basis of nationwide non-exclusive licensing obviates the need for partitioning and disaggregation.

E. Technical and Operational Rules

1. Regulation Under Parts 15 and 101

88. *Background.* The Commission has traditionally regulated fixed, point-to-point, and point-to-multipoint operations generally under Part 74 (broadcast auxiliary), Part 78 (Cable Television Relay Service (CARS)) or Part 101 (commercial and private) of the Commission's Rules.[225] In the *NPRM,* the Commission noted that there are similarities between the services contemplated in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands and existing Part 101 fixed microwave services such as the 39 GHz service.[226] Thus, the Commission tentatively concluded that regulation under Part 101 and 15 of our Rules is appropriate for commercial use of these bands and unlicensed operations, respectively.

89. *Discussion.* All commenters who addressed this issue supported regulating these bands under Part 101 of our Rules.[227] We agree for the reasons stated in the *NPRM.* Therefore, we will regulate these bands under Part 101, except for the portions of the 92-95 GHz band where non-Federal Government use is secondary and where unlicensed devices will be regulated under Part 15 of our rules.

2. Technical Rules

90. *Interference Protection Criteria. Background.* In the *NPRM,* we proposed to allow licensees to resolve their coordination problems with as little input from the Commission as possible.[228] In

(Continued from previous page)
No. 93-253, Memorandum Opinion and Order on Reconsideration and Third Report and Order, 14 FCC Rcd 10030, 10101 (1999) (Paging Systems Third Report and Order); Rulemaking to Amend Parts 1, 2, 21, and 25, of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, To Reallocate the 29.5-30.0 GHz Frequency Band, To Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket No. 92-297, Fourth Report and Order, 13 FCC Rcd 11655 (1998) (LMDS Fourth Report and Order); Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Service Licensees, Report and Order and Further Notice of Proposed Rulemaking, WT Docket No. 96-148, 11 FCC Rcd 21,831 (1996) (Partitioning and Disaggregation Report and Order).

[224] *Partitioning and Disaggregation Report and Order,* 11 FCC Rcd at 21,843 ¶ 12.

[225] As noted below, we are authorizing only point-to-point operations, and not point-to-multipoint operations.

[226] *NPRM,* 17 FCC Rcd at 12,219 ¶ 93.

[227] Cisco Reply at 9; Loea Comments at 31; Loea Reply at 18; NAS Comments at 9; NTIA Reply at 13; WCAI Comments at 23, 26.

[228] *NPRM,* 17 FCC Rcd at 12,220 ¶ 98.

addition, to the extent we decided to use registration, we asked for comments on whether any of the criteria in Section 101.105 of our Rules could be applied to these bands.[229] Loea suggested that Part 101.111 provided appropriate emission limitations to protect adjacent bands from harmful interference.[230] Similarly, the Joint Parties, Cisco (with modification), and WCAI supported the use of Part 101.111 for the 71-76 and 81-86 GHz bands.[231]

91. *Discussion.* The record gives ample support for the use generally of Part 101 in these bands to curtail possible harmful interference. With respect to the interference protection, the Above 60 GHz Committee of the WCAI (Above 60 Committee) proposed that we protect a desired to undesired ratio (D/U) of up to 36 dB in these bands.[232] While at lower microwave bands a fading factor is often added to a theoretical D/U ratio to yield much higher protection goals,[233] "rain fading will be highly correlated in these frequencies"[234] so the 36 dB protection ratio should be sufficient in these bands for licensees employing digital modulation. The Above 60 Committee also proposed that we adopt an interference threshold-to-interference (T/I) ratio that would cause no more than 1.0 dB of degradation to the static threshold of a protected receiver. We believe that the combination of these two standards will adequately protect both digital and analog systems. Therefore, we will adopt 36 dB as the minimum D/U ratio for protection of prior-filed or existing facilities and a T/I ratio of 1.0 dB.

92. We also seek to limit the out of band emissions using the existing formula in 101.111(a)(2)(ii) applied at the edge of the bandwidth in use. However, we need to specify a maximum value for B in the chart in Section 101.109 to be used in the equation no matter what the actual bandwidth in use. We will adapt Section 101.111(a)(2)(iv) which applies from 24 GHz to 70-90 GHz to achieve the desired result. Therefore, the emission mask for 70, 80, and 90 GHz shall apply only at the edge of each bandwidth used, and not to subchannels established by licenses within the bandwidth in use (1.25, 3.75 etc, up the maximum 12.9 GHz). A carrier of the subchannels can be located sufficiently far from the channel edges so that the emission levels of the mask can be satisfied. The value of B (bandwidth) for all cases shall be 500 MHz and the mean output power used in the calculation is the sum of the output power of a fully populated channel.[235] These criteria will govern interference protection between non-Federal Government stations. NTIA will determine, within its discretion, whether to use the same standards for its coordination for non-Federal Government to non-Federal Government coordination.

93. *Frequency Tolerance. Background.* In the *NPRM* we proposed to apply our Part 101 rules to govern the use of new services in the 71-76, 81-86 and 92-95 GHz bands. We solicited comment on all

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[229] *Id.*

[230] Loea Comments at 15.

[231] Joint Parties Reply at 6; Cisco Comment at 32; WCAI Comments at 23.

[232] *See*, e.g., Letter from Andrew Kreig, President Wireless Communications Association, International, to Marlene Dortch, Esq., Secretary, Federal Communications Commission 2-3 (September 30, 2003) (*WCAI Letter*).

[233] *See Interference Criteria for Microwave Systems*,TSB-1F, Telecommunications Industry Association, 1994

[234] *See WCAI Letter* at 2.

[235] The equation: A = 11 + 0.4 (P – 50) + 10 Log B, where A is the attenuation below the mean output power level, P = the percent removed from the carrier frequency, and B= the authorized bandwidth in megahertz, would yield an attenuation of 38 dB for P=50% and B=500 at the channel edge. This is the same value used for MVDDS.

technical parameters that should apply to operations at 71-76, 81-86 and 92-95 GHz, and specifically suggested a 0.03 % frequency tolerance specification. Loea, based on its perception that the complete 5 GHz segment in each of the 71-76 GHz and 81-86 GHz bands should be authorized, opposed any specification for frequency tolerance in these bands.[236] Similarly, Cisco argued against specifying any frequency tolerance.[237] The FWCC, on the contrary, supported a 0.03% frequency tolerance specification.[238]

94. *Discussion*. The record indicates that a wide range of uses are anticipated for these bands. For example, a number of commenters stated that the 71-76 GHz and 81-86 GHz bands will be used to provide high capacity data transmission services.[239] In order to accommodate these varied services, and to provide licensees the necessary technical flexibility to meet demands, we believe that any benefits to be gained by adopting the proposed 0.03% frequency stability specification will be outweighed by the limits it will place on the early development of these bands, particularly in light of other interference safeguards in our rules.[240] Our basis for this view stems from our desire to provide licensees flexibility in the range of services provided, and to avoid imposing unnecessary regulations. In addition, we believe such a standard could inhibit technological advances. The concerns that elimination of this standard may lead to inter-system interference are addressed by our existing out of band emission requirements (emission mask) contained in Sections 101.111 of the Commission's Rules.[241] Should this emission requirement prove inadequate for this band, we will revisit these parameters. Thus, we believe that, at present, strict adherence to Section 101.111 will be as effective in controlling harmful interference as the imposition of a frequency tolerance standard. We believe that this action should provide the flexibility necessary for manufacturers to develop equipment in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands. Furthermore, we find this action to be consistent with that taken for the 39 GHz band on the frequency tolerance issue.[242]

95. *Restrictions on Total Radiated Power and Antenna Directionality. Background.* In the *NPRM* we requested comment on whether there was a need for EIRP limits in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands.[243] Loea proposed to adopt a maximum EIRP of +55 dBW, based on Dr. Lovberg's paper,[244] which concluded that this EIRP is high enough to allow broadband communications at 99.999%

[236] Loea Comments at 35.

[237] Cisco Comments at 32.

[238] FWCC Comments at 12.

[239] *See, e.g.*, IBG Comments at 1; Cisco Comments at 6; KCC Inc. Comments at 1; Wi-Fi Alliance Comments at 2.

[240] *See* 47 C.F.R. §§ 101.105 and 101.111.

[241] 47 C.F.R. § 101.111. The rule requires frequencies removed in various percentages from the center frequency to be attenuated below the mean power of the transmitter. This means that the frequencies at the outer edges of an assigned 1250 MHz channel or the edge of an aggregated group of 1250 MHz channels power levels will be significantly reduced such that interference to an adjacent channel licensee is unlikely.

[242] *See 39 GHz R&O, 12* FCC Rcd at 18,629 ¶ 59, 18,631 ¶ 63.

[243] *NPRM,* 17 FCC Rcd at 12,221 ¶ 100.

[244] Dr. John Lovberg, CTO, Loea Communications Corporation, "Specific Proposals for Technical Rules Governing the 71-76,81436, and 92-95 GHz Bands," (filed Dec. 18, 2002) (Lovberg Paper) (discusses the standards proposed by the WCAI Over 40 GHz Committee).

availability, yet not so high as to cause undue interference.[245] Loea also requested that the Commission specify a minimum 50 dBi gain and a 0.6 degree half-power beamwidth for the antennas used in the 71-76 and 81-86 GHz bands, based on Dr. Lovberg's paper and WCAI's support for these parameters.[246] WCAI proposed standards for antenna gain and directionality along with a radiation pattern table for Standard A and Standard B antennas.[247] This proposal allowed for Standard B antennas which would have a gain less than 50 dB and a proportional reduction in power relative to the reduction in gain. Similar standards and antenna gain and directionality tables were given by the Joint Parties.[248] Endwave requested a higher limit on EIRP of 65 dBW, with suitable limits on antenna gain, indicating that such level is required to meet the needs of 10 Gbps data links with high reliability.[249] Cisco opposed a strict definition of antenna gain and patterns, and instead identified Automatic Transmitter Power Control (ATPC) as the most essential element in controlling Total Radiated Power, based on its computer simulation results with ATPC and antenna patterns.[250] However, Cisco's simulations also concluded that side-lobe and back-lobe performance on antennas were as important as the antenna's half-power beam-widths,[251] which indicates that in heavy rain, ATPC might be less effective in avoiding harmful interference than a well-designed antenna pattern.

96. *Discussion.* We are persuaded that in order to realize the overall ubiquity of spectrum use invoked by the "pencil beam" concept, the highest attention must be given to the overall antenna radiation pattern and ATPC. We concur with Loea, that, under heavy rain circumstances, neighboring links would be using the maximum power triggered by the ATPC, and the antenna pattern might not give enough attenuation to avoid inter-system interference.[252] We are not persuaded by commenters who seek to require ATPC, because we are in the early stages of development of equipment for these bands, and we believe that manufacturers would benefit more from relaxation of the transmitter equipment specifications than from relaxation in the antenna requirements. Thus, we believe that users need not bear the additional cost of ATPC. In fact, we can see more benefits from allowing more flexibility in the manufacturing of the transceivers, which contain more expensive hardware, than in the manufacturing of the antennas. We foresee that legacy antennas with undesirable radiation patterns that would be approved today could pose serious obstacles to the growth of microwave links in these bands in highly populated urban areas in the future. We agree with Loea's antenna pattern proposal of 50 dBi and 0.6 degree half-power beamwidth, which was supported by most commenters. Therefore, we will modify the table in Section 101.115 of our rules to require that the minimum antenna gain shall be 50 dBi and the maximum beamwidth to 3 dB points shall be 0.6 degrees. We also agree with WCAI's proposal for technical parameters for Standard A antennas because we seek to maximize the efficiency and use of this spectrum. However, we do not agree with adopting parameters for antennas which would have a gain of

[245] Loea Comments at 36; Lovberg Paper at 4.

[246] *Id.*

[247] WCAI Comments at 27-28.

[248] Joint Parties Reply Comments at 6-8.

[249] Endwave Comments at 5.

[250] Cisco Comments at 26-27.

[251] *Id.* at 27.

[252] Loea Comments at 42 (Dr. Lovberg's paper at 12).

less than 50 dB. Therefore, we do not adopt WCAI's technical parameters for Standard B antennas. Accordingly, we will authorize only one standard antenna.

97. In the *NPRM*,[253] the Commission proposed to make the 92-95 GHz band available for unlicensed use and set forth proposed rules[254] that are based on existing regulations for the 57-64 GHz band.[255] It suggested that power levels for 57-64 GHz unlicensed operation are also appropriate for 92-95 GHz. We here create a new Section 15.257 that is based on Section 15.255 for 57-64 GHz, but reflects our limitation of unlicensed devices to indoor use.[256]

98. *RF Safety. Background.* In the *NPRM,* the Commission proposed that licensees and manufacturers be subject to the RF radiation exposure requirements specified in Sections 1.1307(b), 2.1091 and 2.1093 of our Rules.[257] The Commission also asked for comments on requiring routine environmental evaluations for RF exposure in the case of fixed operations, including base stations, in cases where there is a possible safety risk if the installation of the transmitter antenna is not properly designed.[258]

99. *Discussion.* The record does not provide detailed comments concerning the issue of RF safety. WCAI, Harris and Loea agreed with the Commission's exposure requirements in the *NPRM*, explaining that such requirements would give adequate protection to the public.[259] NRAO indicated the Commission has transferred the free space loss calculation results from the 57-64 GHz band to the higher frequencies considered in the *NPRM*.[260] NRAO contends that the atmosphere is *significantly* more transparent at these higher frequencies, and therefore more conservative calculations should be made when attempting to predict safety exposures and potential for harmful interference.[261] On June 26, 2003, the Commission issued a *Notice of Proposed Rule Making* which would update exposure limit requirements.[262] Therefore, we conclude that the existing exposure requirements found in Sections 1.1307(b), 2.1091 and 2.1093 of our Rules are sufficient, pending the result of that proceeding.

F. PROCEDURAL MATTERS

1. Final Regulatory Flexibility Analysis

[253] *NPRM,* 17 FCC Rcd at 12,205 ¶ 62.

[254] *Id.* at 12,237 (Appendix B).

[255] 47 C.F.R. § 15.255.

[256] *See* para. 40 *supra*; Final Rules, Appendix B, Section 15.257.

[257] *NPRM,* 17 FCC Rcd at 12,222 ¶ 102.

[258] *Id.*

[259] WCAI Comments at 29; Loea Comments at 36; Harris Comments at 14.

[260] NRAO Comments at 2.

[261] *Id.*

[262] Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields, *Notice of Proposed Rule Making*, ET Docket No. 03-137, 18 FCC Rcd 14,708 (2003).

100. A Final Regulatory Flexibility Analysis has been prepared for the *Report and Order* and is included in Appendix A.

2. Paperwork Reduction Analysis

101. This *Report and Order* contains either a new or modified information collection. As part of the Commission's continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on revision to the information collections contained in the *Report and Order* as required by the Paperwork Reduction Act of 1995.[263] Public and agency comments are due ***[60 days after date of publication in the Federal Register].*** Comments should address:

- Whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility.
- The accuracy of the Commission's burden estimates.
- Ways to enhance the quality, utility, and clarity of the information collected.
- Ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

102. Written comments by the public on the proposed and/or modified information collections are due 60 days after the date of publication in the *Federal Register*. Written comments must be submitted by the OMB on the proposed and/or modified information collections on or before 120 days after the date of publication in the *Federal Register*. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Judith B. Herman, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to jboley@fcc.gov, and to Kim A. Johnson, OMB Desk Officer, Room 10236 New Executive Office Building, 725 Seventeenth Street, N. W., Washington, D.C. 20503, or via the Internet to Kim_A._Johnson@omb.eop.gov. For additional information concerning the information collection(s) contained in this document, contact Judith B. Herman at 202-418-0214, or via the Internet at jboley@fcc.gov.

3. Further Information

103. For further information concerning the *Report and Order*, contact Jennifer Burton regarding legal matters, and/or Gerardo Mejia regarding engineering matters via phone at (202) 418-0680, via TTY (202) 418-7233, via e-mail at Jennifer.Burton@fcc.gov; Gerardo.Mejia@fcc.gov, respectively, or via regular mail at Federal Communications Commission, Wireless Telecommunications Bureau, 445 12th Street, SW, Washington, D.C. 20554.

104. Alternative formats (computer diskette, large print, audio cassette, and Braille) are available to persons with disabilities by contacting Brian Millin at (202) 418-7426, TTY (202) 418-7365, or via e-mail to bmillin@fcc.gov. This *Report and Order* can be downloaded from the Commission's website at www.fcc.gov/wtb/orders.

[263] *See* Pub. L. No. 104-13.

G. ORDERING CLAUSES

105. ACCORDINGLY, IT IS ORDERED that, pursuant to Sections 1, 4(i), 301, 302, 303(f) and (r), 309(j) and 332 of the Communications Act of 1934, as amended, 47 U.S.C. 1, 154(i), 301, 302, 303(f) and (r), 309(j) and 332, this *Report and Order* is ADOPTED.

106. IT IS FURTHER ORDERED that the Commission's Consumer Information and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary